

# Male Incarceration, the Marriage Market and Female Outcomes<sup>\*</sup>

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## Abstract

This paper studies how rising male incarceration has affected women, through its effect on the marriage market. Variation in the marriage market shocks arising from incarceration is isolated using two facts: the tendency of people to marry within marriage markets defined by the interaction of race, location and age; and the fact that increases in incarceration have been very different across these three characteristics. Using a variety of estimation strategies, including difference and fixed effects models and TSLS models in which we use policy parameters to instrument for within marriage market changes in incarceration, we find strong and consistent evidence that women have been affected by rising incarceration precisely as the standard marriage market model would imply. Higher male imprisonment has lowered the likelihood that women marry, and reduced the quality of their spouses when they do, and caused a shift in the gains from marriage away from women and towards men. The evidence suggests that women in affected markets have increased their schooling and labor supply in response to these changes.

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## 1. Introduction

Whether measured in totals or as a fraction of the population, more Americans are incarcerated than in all but a few countries in the world.<sup>1</sup> The remarkably high levels of incarceration observed today are mainly the results of changes over the past three decades, during which time the number of Americans behind bars more than tripled (Maguire and Pastore (2000)). Although research on the increase in incarceration has tended to focus on the connection between prison populations and crime (Levitt and Kuziemko (2001), Levitt (1996), and Marvell and Moody (1994))<sup>2</sup>, most of the controversy about rising incarceration has not been about this putative relationship. Rather, critics have bemoaned things like the severity of sentencing, the alleged inequities of sentencing along racial and class lines, and the notion that incarceration may negatively affect the communities from which prisoners come.<sup>3</sup> This paper explicitly studies one such incarceration “externality”, about which there has heretofore been little formal analysis: how rising incarceration levels affects marital and other outcomes for women.

High levels of incarceration lower the number of men freely interacting in society. The main marriage-related effect of incarceration should thus be to lower women’s marriage probabilities, simply because there are fewer potential husbands to go around. The seminal work of Becker ((1973), (1974), and (1981)) on marriage markets suggests other, more subtle effects as well. In particular, a reduction in the number of men should shift the gains from marriage away from wives and towards husbands, and from women to men more generally. Women should thus be more likely to marry men whose marital advances they would have previously rejected, when they do marry at all. These effects tend to lower women's economic well being. Women confronting high male incarceration rates might thus be expected to take actions, like working

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<sup>1</sup> The Bureau of Justice Statistics reports that there were more than 2.1 million Americans held in jails or prisons in 2003. This reflects a total rate of incarceration of about 715 Americans per 100,000: a rate of more than 1,300 per 100,000 for men, and one of about 113 per 100,000 women. These rates are higher than all comparable rates in all OECD countries. See *Society at a Glance: OECD Indicators*, 2001.

<sup>2</sup> Incarceration is thought to lower crime by two mechanisms: an “incapacitation effect”, whereby crime is lowered because criminals are removed from society; and a “deterrence effect”, whereby the threat of imprisonment dissuades would-be criminals from engaging in criminal activity in the first place.

<sup>3</sup> For example, the organization The Drug Policy Alliance argues that incarceration policy has had a disproportionately devastating impact on minority families. (See <http://www.drugpolicy.org/communities/race>). In recent years, criminal justice experts, judges and prisoners' rights groups, a former “Drug Czar” (Gen. Barry McCaffrey), and former supporters like former State Senator John Dunne have called for the repeal or reform of laws like New York’s so-called “Rockefeller Laws” on the grounds that the prison sentences they mandate are unjust and disproportionate to the crimes. (See *New York Times* Editorial, May 12, 2002.)

more or investing in additional schooling, which augment their earnings power and economic independence.<sup>4</sup>

Have recent increases in incarceration produced these effects? Although rising incarceration levels have coincided with a nationwide reduction in marriage, it is not clear that these aggregate correlations represent causal relationships. Higher incarceration might partly reflect unobserved changes in male behavior that could have independently affected marriage outcomes. Alternatively, changes in social conventions about marriage might have coincidentally occurred at the same time as rising incarceration levels, rendering any connection between incarceration and marriage outcomes spurious. Without some way of controlling for various confounding factors of this sort, it is difficult to say anything about incarceration's possible causal effects.

Our main innovation for dealing with these difficulties is to exploit the fact that the overwhelming majority of marriages occur between men and women in distinct "markets", defined by the interaction of race, age, and geographic region. Because the increase in incarceration has varied tremendously over these three categories, rising incarceration has lowered the relative presence of men by very different amounts in different marriage markets. We are therefore able to use variation both across different markets at a point in time and, especially, within markets over time, to identify the effect of interest.

A major advantage of the standard panel data models we estimate is that they account for the contaminating effect of latent factors that are fixed over time. However, estimates from these models might still suffer from endogeneity bias to the degree that unobserved factors, such as male "criminality", change within marriage markets over time. Another problem with standard panel data methods is that they likely exacerbate any attenuation bias problems associated with the mis-measurement of a marriage market's male incarceration rate. This measurement problem arises both because the "markets" we define only imperfectly measure the pools within which men and women date and marry, and because it is not possible to say with certainty what spatial market an incarcerated man would have belonged to, were he not in jail.

Although we cannot formally disprove the notion that incarceration changes are the result of unobserved changes in male behavior, we use data from the Monitoring the Future (MTF) study to show that there is no relationship between the levels adolescent drug use among different types or cohorts of adult men and the incidence of incarceration among them – suggesting that

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<sup>4</sup> This paper is interested in the effect of male incarceration on women's outcomes. Using the standard marriage market model to understand the impact of higher incarceration on un-incarcerated men does not lead to the same sharp empirical predictions, for reasons discussed later in the paper. Nonetheless, at the end of our main analysis, we present and discuss some results for men.

incarceration changes are likely the result of exogenous policy changes. We then use an instrumental variables strategy to address any endogeneity and measurement error problems in the standard panel estimates. Using nationally representative data from the National Judicial Reporting Program on the actual sentences received by convicted felons in state courts, we show that the state- and race- specific adjudication of drug cases and their relative prevalence in state caseloads explain much of the within-marriage market changes in incarceration.<sup>5</sup> We then perform a series of two stage least squares regressions, in which we use these policy variables as instruments for within marriage market changes in incarceration.

On the whole, our results strongly support the idea that rising male incarceration causally affected women's outcomes in precisely the manner predicted by the standard marriage market model. Our confidence in these results is bolstered by the similarity of the results under alternative estimation strategies, including the addition of a variety of controls and the use of an alternative definition of marriage markets, and by the range of outcomes for which we find effects consistent with the causal interpretation.

Figure 1 illustrates the basic estimation strategy and the results for the main marriage-related measure – whether women have ever been married. This expositional analysis only uses observations from the beginning and end of the sample period - the 1970 and 2000 Censuses, and is not regression adjusted using any controls whatever. For each marriage market, panel A of the figure plots the incarceration rate of men (the number of men from that race/state/age cell who are incarcerated, divided by the total number of such men) against the proportion of the women in the market who report ever having been married. The fitted regression line shows a strongly negative and strongly statistically significant relationship: each one percentage point increase in the incarceration rate is associated with a 2.4 percentage point reduction in the fraction of women in the marriage market who are ever married. The second panel of the figure relates the *change* in male incarceration to the *change* in women's ever married status, for each marriage market. The estimated relationship remains negative and significant, but is now substantially reduced. A percentage point increase in the male incarceration rate in a market lowers women's ever-married probabilities by 0.6 of a percentage point.

The large reduction in the estimated effects between the cross-sectional and difference results most likely indicates the contaminating influence of fixed, latent factors within markets. However, the estimates in panel B are also more likely to be affected by attenuation bias arising

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<sup>5</sup> This is consistent with the commonly held notion that the “War on Drugs” accounts for much of the run up in incarceration. We examine but ultimately do not use variation associated with announced sentencing guidelines within states, as the data from actual sentences received and time served within states do not line up at all well with these announced guidelines.

from measurement error than the estimates in panel A. Instrumental variables applied to the regression version of panel B should deal with this latter problem, and also with any endogeneity bias not accounted for by differencing. For this measure and the others we study, the TSLS estimates tend to fall between the estimates corresponding to those shown in the two panels of Figure 1. For virtually all of the measures, the estimated effects are consistent with the predictions of the marriage market model.

The paper contributes to several different literatures. One connection is to the literature studying the relationship between the *number* of men relative to women in a market and marriage market outcomes.<sup>6</sup> We estimate effects similar to these papers, but unlike previous work we study how marriage markets are affected by a policy – incarceration – that is of ongoing, controversial interest, and we also study a broader range of outcomes. Other authors have been interested in how the *characteristics* of men in a marriage market affect women’s mean marriage rates. One important strand of this literature originates with Wilson’s (1987) conjecture that low marriage rates among Black women might be because of a small supply of “marriageable” men – young men with high, stable earnings. Wood (1995) finds only weak evidence in support of the notion but, more importantly, we illustrate below that incarceration is concentrated among men whose labor markets earnings would have likely been low and unstable. The phenomenon we study thus cannot be the source of the disappearance of high earning men that is the focus of that literature. However, to the degree that men’s *presence* in the market is an important aspect of what makes them “marriageable”, the paper’s connection to that other literature is obvious. Although it focuses on a distinct question and studies a broader range of outcomes, the paper is also related to work by Gould and Paserman (2003) and Loughran (2002), who both study the effect of male wage inequality, and Blau, Kahn and Waldfogel (2000) who study the effect of men’s and women’s average labor force outcomes on marriage rates.

The remainder of the paper is organized as follows. The next section summarizes changes in incarceration over the past few decades, with particular attention paid to how these patterns have differed for different types of men. We then show why these men may be thought of as belonging to different marriage markets. Section 3 presents the empirical framework and research strategy. Section 4 assesses the importance of policy changes related to the War on Drugs in accounting for the incarceration patterns. Section 5 presents the results, extensions, and robustness tests. Section 6 concludes.

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<sup>6</sup> Examples include Guttentag and Secord (1983), Cox (1940), Frieden (1974), Chiappori, Fortin and Lacroix (2001), South and Trent (1988), South and Lloyd (1992), and Angrist (2002).

## 2. Basic Facts about Incarceration and Marriage Markets and Predicted Theoretical Effects

### 2.1 Imprisonment over the Past 30 Years

Most of the analysis in the paper is conducted on data from the various Census IPUMS from 1970 to 2000. The 1970 and 1980 Censuses identify inmates in jails or prisons.<sup>7</sup> However, in 1990 and 2000, the Census indicates only whether a respondent is “institutionalized”. We treat the young men characterized as “institutionalized” as being incarcerated. Several things justify this decision. For one thing, given the set of institutions used by the Census to define the “institutionalized” population, mental institutions are the only other kind of institutions in which young men could logically be located.<sup>8</sup> Work by Grob (2000) shows that the number of persons in mental institutions has plummeted in the past few decades, meaning that in later years, “institutionalized” effectively means “incarcerated”.

Using the 1970 and 1980 data, we compute the fraction of people who would have been classified as institutionalized in those Census years according to the 1990 and 2000 definitions, but who were actually in jails or prisons in 1970 and 1980. We find that for the men in the sample, in these early years when mental institution populations were much higher, more than three-quarters who would have been classified as “institutionalized” were in fact inmates, as expected.<sup>9</sup> Finally, the patterns of incarceration from the definitions we use is consistent with the aggregate information on incarceration from the Bureau of Justice Statistics.<sup>10</sup>

The paper studies men aged 20-35. In the analysis to follow we split these men into younger (20-27) and older (28-35) groups, but in this initial section we present average incarceration figures for the all men 20-35. Census respondents report not only their age, but also their race and state of birth. We focus on three race categories: Whites, Blacks, and non-Black,

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<sup>7</sup> “Jails” in the United States are institutions which house individuals with incarceration terms a year or less. “Prisons” house persons with longer terms of imprisonment. We will not distinguish between these terms in the paper.

<sup>8</sup> In 1990 and 2000, institutionalized persons are in: jails and prisons, mental institutions, institutions for the elderly handicapped and poor, nursing and convalescent homes, homes for neglected/depend children, other institutions for children, deaf/blind schools, schools for “feeble minded”, sanatoria, poor houses and almshouses, poor farm/workhouses, homes for unmarried mothers, widows and single women, and detention homes.

<sup>9</sup> For younger men aged 20-27, the proportion was 78% in 1970 and 1980; for men aged 28-35, the proportions were 68% in the two years.

<sup>10</sup> We do not use this BJS data in our analysis because it is not possible with these data to do the disaggregations so central to our analysis.

non-White Hispanics. For each state of birth, we compute the proportion of men of a given race who are incarcerated in a given Census year.<sup>11</sup> Figure 2 graphically summarizes these numbers.<sup>12</sup>

The middle line in each graph shows the mean, across all states of birth, of the incarceration rates for men on the type indicated in the graph heading. The top line in each figure shows the 90<sup>th</sup> percentile (the fifth highest state) of the distribution of incarceration rates across states. The bottom line shows the 10<sup>th</sup> percentile (the fifth lowest state) of the same distribution. We exclude from these graphs race/state cells for which the number of observations in the Census was too small to compute mean estimates. So, for example, the graphs do not include values for young Hispanics born in North Dakota, or young Blacks born in New Hampshire, as these cells are vanishingly small. In the analysis that follows, we weight all regressions by the cell size for which the incarceration rate is measured. Although the basic patterns documented above accurately reflect changes in incarceration over time, there is likely to be error in the measured rate for any particular type of men (and especially racial minorities from some states).<sup>13</sup>

These figures, which are all drawn with the same scale, reveal several interesting facts. First, for all races, most of the increase in incarceration between 1970 and 2000 occurred after 1980, and especially after 1990. The trends in the mean, and for the 90<sup>th</sup> and 10<sup>th</sup> percentiles indicate that this post-1980 increase occurred across the country, and not only in a select set of states, although differences across states for men of a given race tended to widen over time. For example, the difference in incarceration rates among blacks in the high versus low incarceration states was 6 percentage points in 1990 and grew to 10 percentage points in 2000. Finally, and most dramatically, the graphs reveal how markedly the incarceration experience of young men has differed across races, both over time and in any particular year. Most notably, the incarceration rates of young Black men reached a staggering eighteen percent in 2000, while that for Hispanics was ten percent. These numbers completely dwarf the comparable numbers for Whites.

Table 1 shows the distribution of schooling among incarcerated and other men over the 1970-2000 Censuses. Among all men in prison over the various Census years, about forty-five percent have less than a high school education, while another thirty seven percent have only a high school degree. The same basic pattern exists for all racial groups. This distribution of education is very different from that observed among men who are not in prison, suggesting that

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<sup>11</sup> Later, we discuss the choice of state of birth rather than state of residence.

<sup>12</sup> The numbers on which the graph is based are presented in Appendix Table 1

<sup>13</sup> We compute but do not present incarceration rates by Census “division” – collections of roughly 5 or 6 states apiece. Reassuringly, the basic patterns of incarceration, by race, are quite consistent with the state numbers.

incarceration draws disproportionately from the lower portion of the schooling distribution for all races. It is nonetheless important to note that while the low educated are much more likely to be represented in prison, rising incarceration has occurred across the education distribution.

## **2.2. *Marriage Markets: Who Marries Whom?***

Do the men shown in Figure 2 belong to different marriage markets - distinct groups of men and women who tend to marry within the group? If so, the patterns depicted in Figure 2 indicate that incarceration produced different shocks to these different markets. This fact can be exploited to identify the effects of interest.

Table 2 summarizes sorting by race and age among married couples in the United States from 1970 to 2000.<sup>14</sup> The first panel shows the fraction of all women of a given race and age group who marry men of particular races. The results are striking: virtually all marriages occur between people of the same race. This is especially true for Black and White Americans. For these groups, well over ninety percent of marriages are within-race. The numbers are lower for Hispanics, probably because being “Hispanic” is partly an ethnic classification. However, even for this group within-race marriage is by far the most common outcome.

The second panel looks at marital sorting by age category. The table shows that, irrespective of race, women tend to marry men who are slightly older. For example, among wives aged 18-25 of all races, more than seventy percent are married to men aged 20-27. For wives aged 27-33, similarly high fractions are married to men aged 28-35.

These numbers indicate that men of a given race and narrow age range compete for slightly younger wives of the same race. Marriage markets also surely involve a spatial dimension. We know Census respondents' state of birth and state of residence, as of the survey. One problem with using state of residence to characterize a marriage market is that where a person chooses to live may be partly determined by local marriage market conditions. More importantly, because being a prisoner in a given state does not indicate that the person lived in and socially interacted in that state, using state of residence would systematically assign people to the wrong marriage market.<sup>15</sup> In particular, states with a large number of federal prisoners, who are drawn from all over the country, would tend disproportionately to be coded as having a large fraction of their men behind bars. For these reasons, we distinguish persons in the sample by their

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<sup>14</sup> We have examined sorting in other Census years and find patterns by age, race and state that are, if anything, stronger than those in these more recent years.

<sup>15</sup> Prisoners in the state prison system will generally have committed their crimes in the state, but need not have lived there. In the federal system, which houses many persons serving drug related sentences, convicted persons may serve their sentences in any of the country's federal facilities.



states of birth, recognizing that we still only imperfectly characterize the spatial dimension of people's marriage markets.<sup>16</sup> The assumption that sorting occurs by state of birth is borne out reasonably well in the data, as sixty percent of all wives, irrespective of race or age, marry men born in the same state.

The patterns above suggest that, to a first approximation, marriage markets in the U.S. can be characterized by the interaction of race, state and age. In what follows, we will focus on markets consisting of men and women of a specific race, born in a given state, and who are aged either 18-25 for women and 20-27 for men, or 26-33 for women and 28-35 for men. It bears repeating that these "markets" are a useful empirical aid, but almost certainly do not completely represent the groups in which men and women seek spouses. However, the patterns above indicate that they represent groups within which marriages *are most likely to form* for the persons in question.

### **2.3 Theoretical Overview: Incarceration and Standard Marriage Market Model**

What are the predicted effects of the incarceration "shocks" to marriage markets outlined in the previous section? The simple marriage market framework presented by Becker (1973) suggests some possible answers. In the model, household production of a perfectly divisible product is made by a technology using the "quality" of the husband and wife as inputs. There are presumed to be gains from marriage, meaning that married households produced more than the sum of the output of an unmarried man and unmarried woman.<sup>17</sup> Equilibrium in the marriage market satisfies two conditions. First, the marital sorting of men and women in equilibrium is such that total societal output is maximized. Second, the law of one price holds in equilibrium – meaning that persons of the same type or quality consume the same output in equilibrium. If male and female qualities are complements in the production of household output, as is usually assumed, these conditions imply that there is "positive assortative mating" in equilibrium.<sup>18</sup> That is, marriages occur as if men and women were ranked from highest to lowest in terms of male and female "quality", with each person marrying the highest quality person, if any, that they can persuade to marry them by splitting the rents from household production with them. This sharing of rents occurs until each person receives at least the same output as they would receive from their next best option.

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<sup>16</sup> In robustness tests later in the paper, we present results using state of residence instead of state of birth.

<sup>17</sup> Also see Becker (1974), and Becker (1981)) for discussions and extensions of this model.

<sup>18</sup> Equilibrium would exhibit negative assortative mating in the unlikely event that male and female quality were substitutes rather than complements in household production.

The predicted marriage-related effects of the removal of men from the marriage market following incarceration can be seen in the two panels of Figure 3.<sup>19</sup> The top panel shows the initial equilibria for three marriage markets with different distributions of quality across men and women. For illustrative purposes, we make the inessential assumption that the number of men initially equals the number of women, so that all men and women marry. In market A, where the distribution of quality is the same across the sexes, men and women each marry someone of the same quality in equilibrium. In markets like B, where there are relatively fewer high quality men, some high quality women “marry down” – that is, end up with husbands of lower quality. Conversely, if a market has relatively more high quality men, like market C, some lower quality women are able to “marry up” in equilibrium.

The bottom panel of Figure 3 illustrates the effect of increased male incarceration, and the main marriage outcome effects for which the paper tests. Consistent with the actual patterns of increased incarceration discussed above, the figure depicts incarceration as drawing disproportionately from the pool of lower quality men. (Throughout, we use schooling as an index of quality for both men and women). Since higher incarceration lowers the number of men relative to women, its first and most obvious marriage-related effect should be to lower the incidence of marriage among women overall. Second, because the men withdrawn from the marriage market would have tended disproportionately to marry lower quality women, higher incarceration should raise the likelihood of non-marriage more for them than it does for their higher quality counterparts. Third, the male scarcity arising from incarceration should raise the odds that high quality women “marry down” when they do marry, and/or lower the probability odds that lower quality women “marry up”, conditional on them marrying at all.

Increased male scarcity has other implications for women. Women who do not marry when men are scarce are hurt because they do not receive the production benefits associated with marriage. Women who *do* marry when men are scarce are hurt as well because of the law of one price. By that equilibrium condition, any married woman receives the same “output” in equilibrium as an otherwise identical unmarried woman. In other words, as Becker and others have shown, an increase in the number of unmarried women lowers the bargaining power of married women, causing them to make more within-marriage transfers to their husbands.<sup>20</sup> By

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<sup>19</sup> Becker (1981) presents a thought experiment in which there is a change in the number of men relative to women in a market because of massive immigration. Many of the theoretical effects outlined in this paper can be traced to the Becker discussion. Indeed, the specific example of large scale immigration and its impact on the marriage market has been studied by Angrist (2002).

<sup>20</sup> This theoretical notion of “transfers” subsumes things both very serious concerns like the distribution of work effort in the family or sexual fidelity, and less serious matters like which spouse washes dishes, or whose entertainment choices will be honored.

lowering female economic wellbeing, greater male scarcity should thus raise women’s incentives to increase their economic independence by means such as investing in additional schooling or working for pay. In addition to the marriage outcomes described above, we therefore assess the impact of higher male incarceration on these two outcomes for women, and on the likelihood that women are poor.

### 3 Empirical Framework

#### 3.1 Basic Setup

The analysis seeks to estimate the causal effect of the incarceration rate of men in a marriage market on marital and others outcomes for the women in those marriage markets, holding all other factors constant. Although we have millions of individual level observations from the IPUMS, all of the variation in the analysis occurs at the race, state, age level across Census years. To make our estimation approach transparent, we therefore collapse all of the data down to the marriage market (race, state, age), and time level, yielding a total of around 1200 observations – 300 marriage markets across four Census years.

We assume that the structural relationship between outcome  $Y_{m,t}$  for women in marriage market  $m$  in time  $t$ , and the male incarceration  $J_{m,t}^*$  for men in that market is given by

$$Y_{m,t} = \beta_0 + \beta_1 X_{m,t} + \beta_2 J_{m,t}^* + \varepsilon_{m,t}. \quad (1)$$

In (1),  $X_{m,t}$  is a set of observed characteristics about the marriage market in Census year  $t$ . The error term  $\varepsilon_{m,t}$  represents all unobserved determinants of outcomes  $Y$ .

We are interested in estimating the parameter  $\beta_2$ . In general, regression (1) will fail to yield consistent estimates for two reasons. First, the estimate of  $\beta_2$  may suffer from endogeneity bias because of possible correlation between the incarceration rate and unmeasured components of the error term,  $\varepsilon_{m,t}$ , such as unobserved male behavior or female preferences. Second, because we observe an error-ridden version of the true incarceration rate of men in a marriage market,<sup>21</sup> the estimate of  $\beta_2$  from (1) will, in general, also suffer from attenuation bias.

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<sup>21</sup> As noted earlier, this mis-measurement arises because the marriage markets we define only imperfectly characterize the dimensions along which men and women date and marry, and also because of issues such as how the Census defines and measures institutionalized populations.

Since we have multiple observations on marriage markets over time, it is natural to apply standard panel data methods as a first step to possibly solving the endogeneity problem in (1). Unfortunately, these models are likely to exacerbate the attenuation bias in (1).<sup>22</sup> For example, in the differenced version of (1)

$$\Delta Y_{m,t} = \beta_1 \Delta X_{m,t} + \beta_2 \Delta J_{m,t}^* + \Delta \varepsilon_{m,t}, \quad (2)$$

much of the “signal” in the measured incarceration rate is removed in the differencing, while the “noise” is increased relative to the (1) because the variable now reflects random mis-measurement in two rather than only one period.

A similar problem arises with a fixed effects model. There, each effect added to the regression to deal with endogeneity removes part of the measured incarceration rate that is “signal”. This raises the fraction of the residual variation in the incarceration rate that is “noise” and increases the attenuation bias in the estimate of  $\beta_2$  relative to (1). We estimate a fixed effects model with approximately 300 fixed effects for each marriage market. We account for the effect of secular changes using a parsimonious set of fixed effects, suggested by the time series pattern of incarceration shown in Figure 2. The figure shows that, for all markets, such secular changes in incarceration as occurred over the past 30 years mostly occurred after 1980. We therefore estimate the model

$$Y_{m,t} = \beta_0 + \beta_1 X_{m,t} + \beta_2 J_{m,t}^* + \theta_m + \theta_{post80} + (\theta_{post80} * \theta_s) + (\theta_{post80} * \theta_r) + (\theta_{post80} * \theta_a) + v_{m,t} \quad (3)$$

where  $\theta_m$  is a vector of marriage market fixed effects,  $\theta_{post80}$  is a dummy variable for the time periods after 1980, and  $\theta_s$ ,  $\theta_r$  and  $\theta_a$  are vector of fixed effects for state, race and age respectively. Regression (3) estimates  $\beta_2$  using variation *within* a particular marriage market, *during* periods of either “low” or “high” incarceration, *from one Census year to the next* during those periods, netting out the effects of general secular changes between the periods of “low” and “high” incarceration, as well as secular changes specific to particular states, races, or age groups.

Apart from the measurement error problems in (2) and (3), both models are subject to the criticism that the estimates of  $\beta_2$  they yield might still be suffer from endogeneity bias. In both models, the effects of interest is identified off of variation within a marriage market over time,

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<sup>22</sup> See Griliches and Hausman (1986) and Angrist and Krueger (1999) for formal discussions of why, in general, panel data methods tend to worsen problems with measurement error.

meaning that the contaminating effect of any latent factors that are constant over time are accounted for. However, it remains possible that part of the *change* in the measured incarceration rate reflects *changes* in some latent factor, relevant to outcomes for women.

A possible solution would be to isolate part of the variation in incarceration rates that is arguably exogenous to anything having to do with women's outcomes. Using an instrumental variables strategy, that variation might then be used to purge the estimates of both measurement error and any residual endogeneity bias that survives the standard panel data corrections. To implement such a strategy it is useful to understand why incarceration has increased the way it has, and identify the part of the variation in incarceration that is plausibly exogenous. We turn to this in the next section.

## 4 Why Has Incarceration Increased?

The rate of incarceration of any given group of men at a point in time reflects both the distribution of the past criminal behaviors engaged in by those men, and distribution of punishments those behaviors received. Of these two factors, it is the possible role of changes in male behavior which generates concerns about endogeneity bias in the estimates of  $\beta_2$  forthcoming from models (2) and (3). How much of the variation in incarceration documented above can be attributed to changes in male behavior? How much can be attributed to explicit policies, arguably exogenous to women's marriage market outcomes? We discuss these in turn.

### 4.1 Was it Behavior? Some Suggestive Evidence From Self-Reported Drug Use

To definitively answer the question about the role played by behavior in accounting for changes in incarceration, one would ideally need self-reported data on criminal offending. For obvious reasons, such data are usually unavailable. Nor is information on other outcomes, such as arrests, very useful since they measure both behavior and the focus and aggressiveness of policy.<sup>23</sup>

In our view, the best available age and race specific data on offending is that for self-reported drug use. Since 1975, the Monitoring the Future study (MTF) has inquired about drug use among a nationally representative sample of high school students. Of course, there is not a perfect relationship between high school drug use and criminal behavior; many young users do not go on to engage in crime, and many criminals may not have used drugs as teens. Indeed, even

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<sup>23</sup> Although the arrest data available in the Uniform Crime Reports are not broken up into particular race/age/state groups that we study, our examination and study of these data finds (not surprisingly) that the arrest trends line up very closely with those for incarceration.

people involved in the criminal drug trade at a point in time as salespeople might not be users themselves. These points notwithstanding, the notion that adolescent drug-use is a path-way into more serious crime is widely established in the social science literature.<sup>24</sup> If changes in incarceration patterns derived principally from changes in behavior, we would expect some sort of positive association between the incidence of imprisonment for particular types of men and their self-reported drug use.

In Figure 4, we present the incarceration rates for men of White and Black men aged 20-27, and 28-35 in 1970, 1980, 1990, and 2000, for each of the four Census divisions.<sup>25</sup> The figure also depicts the self-reported incidence of serious drug use among those men when they were seniors in high school, computed from the MTF.<sup>26</sup> Because the MTF's survey of high school seniors (typically aged 18) begins in 1975, high school drug use information is not available for all of men we study. However, the missing drug use information is for the oldest men in the earlier Census years – groups for whom incarceration rates were very low.

Figure 4 shows that far from demonstrating a positive association, incarceration rates for the different cohorts of men of a particular region/race type have been rising at the same time that high-school drug use for those men has been flat or falling. The same pattern is evident for all groups of men, and across the country.

One concern about the patterns in Figure 4 is that, because the MTF is school-based survey, these patterns underestimate drug use among groups disproportionately likely to drop out of high school. We re-calculated the patterns depicted in depicted in Figure 4, but with the incarceration rate numbers restricted to men who have at least a high school education, ensuring that drug use and incarceration are measured for the same population of men. We do not include those figures, but find that they virtually identical to the patterns in Figure 4. Figure 4 is merely suggestive, but it tends to strongly support the notion that most of the growth in incarceration was not due to changes in behavior – at least as measured by drug use.

#### **4.2 *The War on Drugs***

The phenomenon most frequently cited as the reason for the increase in incarceration is the set of policies known collectively as the “War on Drugs”. Launched in the late 1980s, this

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<sup>24</sup> See, for example, Markowitz (2000), Parker and Auerhahan (1998) and Baumer et al (1998)

<sup>25</sup> We cannot obtain reliable drug use information for Hispanics from the MTF.

<sup>26</sup> Following previous work using the MTF, we characterize “serious” drug use, as the respondent having used an illicit drug, excluding marijuana, sometime within the past month. See Charles and Stephens (2002). The patterns are essentially the same if we used some other measure of use, such as use of any illicit drug at any time.

policy focus on drugs included the start of “Just Say No” in 1986, and the creation of the Office of National Drug Control Office of National Drug Control Policy (The Office of The Drug Czar) in 1988. The drug war was also likely associated with the passage of a series of laws meant to decrease the variance and increase the severity of sentencing for drug offenders and other felons. At the federal level, the Sentencing Reform Act and the Violent Crime Control and Law Enforcement Act were passed by Congress in 1984 and 1994, respectively. Although these laws applied to only a relatively small fraction of all defendants, several states soon followed Congress’ lead and passed laws with features like mandatory minima, sentencing guidelines, truth-in-sentencing (TIS) rules, and so-called “three strikes” policies for offenders in state court.<sup>27</sup>

To what extent can these changes account for the patterns in incarceration we document above? The fact that most of the increases in incarceration occurred after 1980, and especially after 1990, strongly suggests that they had a significant effect. However, there is a growing literature analyzing the fact that judges often depart from sentencing guidelines and other strictures that might be on the books at the phase of sentencing.<sup>28</sup> Further since prosecutors have considerable discretion with respect to the precise charge a defendant faces, and ultimately control the plea bargaining process (in which defendants plead guilty to a lesser charge rather than face trial under a more serious one), there is further reason to be dubious that the mere passage of the laws outlined above accounts for changes in incarceration.

To more formally assess the importance of policy changes related to the War on Drugs, we focus directly on the *actual* composition and adjudication of cases in state criminal caseloads on the grounds that it is these actual sentences that guidelines and other measures were designed to affect. We use data from the National Judicial Reporting Program Series (NCJPRS). This is a data series put together by the Bureau of Justice Statistics division of the U.S. Justice Department, with the first wave of data collected in the late 1980s. Every two years, the series tabulates data about persons tried in state courts – the overwhelming majority of all criminal cases. The data are collected from prosecutors’ offices and state court records from 100 of the largest counties in the country. The survey collects information race, age and sex of defendants, the crimes with which they were charged and the ultimate dispensation of their cases. We focus on data from after 1990, since data on drug possession charged was not collected separately in the first two waves of

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<sup>27</sup> Some of these laws passed by states may have been in reaction to explicit incentives in federal laws. For example, one part of the 1994 Violent Crime Control and Law Enforcement Act was the Violent Offender Incarceration and Truth-in-Sentencing grant program, under which states receive funding for prison expansion, construction and upkeep so long as the state could demonstrate that persons convicted in state court served a large percentage of their sentences.

<sup>28</sup> See, for example, Johnson (2005).

the study. Fortunately, as was shown earlier, the period from 1990-2000 represents nearly 60% of the increase in incarceration since 1970 for all of the marriage markets we study.

Table 3 presents several measures about cases brought against male defendants in state court since 1990, as compiled from multiple years of the NCJPRS. Each case in the data is distinguished by the most serious charge faced by the defendant at trial. The charges are: homicide, rape, robbery, aggravated assault, burglary, larceny, drug possession and drug trafficking, and all other main charges are coded as “other felonies”. Panel A shows, across all counties and states, the distribution of felony charges faced by male defendants at trial. The data show that the fraction of all state prosecutions that were for drug charges rose dramatically over the 1990s, while that for every other type of serious charge either remained constant (“other felonies” and larceny) or fell substantially. At the beginning of the decade, about 21% of men facing trial in state court were being tried on some type of drug charge. By 2000, the number had risen to 38% - 23% of all cases being for drug trafficking charge, and 15% for drug possession.

Especially noteworthy about the trends in panel A is the sharp increase in relative prevalence of drug charges in the middle of the 1990s. Between the 1994 and 1996 surveys, the fraction of all cases devoted to drug cases doubled.<sup>29</sup> What accounts for this sharp change is not clear. One answer might be that the 1994 federal law discussed above created incentives for prosecutors to shift the most serious crimes with which they charged defendants.<sup>30</sup> Whatever the precise explanation, the numbers clearly show that over the 1990s ever larger fractions of prosecutorial action was directed at drug charges as would be expected with a War on Drugs focus.

Panel B of Table 3 presents conviction rates at trial for male defendants in state court. Over the decade, conviction rates for all crimes except drug offenses exhibited remarkably little variation. The conviction rates for homicide, robbery, rape and robbery were, for example, almost exactly the same in 2000 as in 1990, and did not deviate by more than a percentage point in any year during the interval from the particular number. For the two types of drug charges, conviction rates were also relative constant over the decade, except for a modest reduction in the mid 1990s. The same basic patterns are evident in Panel C, which measures the fraction of convicted men who are sentenced to any jail or prison time, by charge.

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<sup>29</sup> There is no change in survey methodology between these two years and conversations with officials from the Bureau of Justice Statistics suggest that these numbers are accurate.

<sup>30</sup> For example, a drug dealer who strikes and injures a competitor could face either a major charge of possession and distribution, or one of assault – a violent offense. Because the 1994 law effectively punished states which did not lock up violent offenders for a long time, a state prosecutor may have had an incentive to bring drug rather than assault charges in this scenario.



The combined effect of the numbers in Panels A-C is shown in Panel D. These numbers represent the fraction of all persons sentenced to jail who were convicted of particular charges. By 2000, almost one-quarter of men sentenced to jail or prison had been convicted of a drug trafficking charge, with another 13.4 percent convicted on a drug possession charge. These numbers represent close to a doubling in the share of new inmates sent to jail for drug offenses from the beginning of the decade. Drug felons' share of the overall new inmate population comes at the expense of every other type of serious felony. For example, while 11.4% of new inmates were convicted of aggravated assault in 1990, only 6.9% of new inmates had convictions for this crime in 2000. The comparable numbers for homicide show an equally dramatic decline from 5.2% of all new inmates to 1.5%. Declines were similar for other types of charges.

On the whole, these numbers suggest that, at the national level, policy changes after the late 1980s had the effect of raising the fraction of drug offenders among the nation's prisoners. This effect arose principally because a higher fraction of all cases brought in state court were drug cases, and not because of changes in conviction for drug or other offenders or a change in the likelihood of being sent to prison once convicted for any sort of offense.<sup>31</sup>

#### ***4.3 Effect of Drug Prosecutions on Change in Incarceration Rates***

Do these policy changes summarized in Table 3 explain an important part of the variation over time in incarceration rates for the marriage markets we study? To answer this question, we collapse the information in the table about drug cases into state/race cells in each year for which there is data from the state.<sup>32</sup> We then take the mean of these measures over the years 1990-2000. Finally, we regress the change in incarceration rates between 1990 and 2000 for each marriage market as measured in the Census on these means. We regard these regressions as showing how policy change directly related to drug offenses, and induced by War on Drugs, affected incarceration rates within specific marriage markets. The regressions control for levels of personal and property crime in the state, ensuring that what we estimate is purely the effect of state/race differences in how drug offenses are treated at the within particular cell, rather than anything having to do with criminal activity (behavior) in the state.

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<sup>31</sup> The data set also contains information on the sentence length received by persons sent to jail. Unfortunately, these numbers are for the maximum length the convicted person *could* serve under the sentence. We do not use these data because of difficulties of interpretation, and because the sentence length we would ideally want would be that measuring the minimum length of time the person had to serve in jail.

<sup>32</sup> Because the dataset contains numbers from a random sample of counties, there are years in which no observations from a given state.

The first four columns of Table 4 show the results with the drug case variables entered one at a time. The results show that each of the four case variables is positively related to the change in incarceration rates within a marriage market. In the last four columns, the regressions include different pairs or other sets of the drug case variable simultaneously into the regression. The current literature on “weak” instruments stresses that this statistical significance is not an indicator of a validity of a potential instrument set. In our context, with one endogenous regressor and a relatively small number of instruments, recent work by Stock, Wright and Yogo (2002) suggests that  $F$ -statistics on the excluded instrument(s) in the first stage regression should be close to 10 for concerns about weak instrument problems to be allayed. The results in the last row of Table 4 table indicate that the drug prosecution and case variables in the regressions labeled (I)-(IV) can definitely be used as instruments for the change in incarceration rate in Two Squared Least Squares (TSLS) estimates of the difference model (2) above. These four regressions represent first stage regressions for that exercise. In addition to these four TSLS results, we also show results in which the change in incarceration is instrumented for by the all of the drug sentencing and prosecution variables. The first stage for these results are shown in the column in Table 4 labeled (V).

## 5 Results

### 5.1 *Baseline, Difference and Fixed Effects Estimates*

Tables 5 and 6 present regression estimates for the estimated effect of male incarceration on the various female outcomes we study, for the baseline specification (1), two forms of the difference model (2), and the fixed effects model (3). In all regressions, we control for maximum welfare payment in the state, and for the total level of personal and property crime in the state (or for the change over time in these measures in the difference equations). The crime controls are added to the regressions so as to account for the overall level of social dysfunction, or lawlessness in a marriage market which could have been responsible for both high levels of incarceration and decreased interest in marriage among women.<sup>33</sup> We control for maximum welfare payments as this important policy change, occurring close in time to increase in incarceration, could have independently changed women’s marriage outcomes. For example, in markets with generous payments, marriage might be a less attractive option for women.<sup>34</sup> For all

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<sup>33</sup> We get property and personal crime numbers for each state in each of the four Census years from the Bureau of Justice Statistics, <http://www.ojp.usdoj.gov/bjs>.

<sup>34</sup> The specific welfare measure we use is the amount of welfare payments a woman with two children, who did not work in the market, would receive in welfare transfers. These figures have been calculated for all

regressions presented in this and later tables, the standard errors are clustered by marriage market to allow for arbitrary correlation of errors within markets over time. In these tables, each set of numbers are from a separate regression, performed on the sample indicated in the panel, and using the specification indicated in the rightmost column. In all regressions, the incarceration rate variable is measured in percentage points.

In Tables 5 and 6, each set of numbers are from a separate regression, performed on the sample indicated in the panel, and using the specification indicated in the rightmost column. The first panel of Table 5 presents the baseline results for the two main marriage related outcomes – whether women have ever been married and the nature of marital sorting. The standard deviation of male incarceration rates across all markets is 2.8 percentage points. The set of numbers in the first column shows that each percentage point increase in male incarceration is associated with a 3 percentage point smaller incidence of ever being married among all women in the marriage market. The point estimate of -0.03 in the first column therefore implies that a one standard deviation higher male incarceration rate in a marriage market is associated with about a 8.4 percentage point lower incidence of ever having been married among the women in the marriage market. This represents about a 14% reduction in the likelihood of marriage, relative to the mean of fifty-eight percent. The estimated association is therefore not only strongly statistically significant, but economically quite meaningful as well.

We showed earlier that because incarceration tends to be concentrated among men in the lower part of the education distribution, ever-married rates should be most affected for lower skilled women than for their higher skilled counterparts when incarceration is high.<sup>35</sup> The next two entries in the first panel bear out this prediction. The second and third estimates in the first panel, of -0.038 for the fraction of women with only high school training who have ever been married, is larger (and statistically different from) the estimated association of -0.021 for the fraction of women with any college training who have ever been married. Higher incarceration is associated with larger reductions in ever married probabilities for lower skilled women.

The final two entries in the first panel investigate the association across markets between male incarceration and the sorting patterns of women and men who do marry. In these sorting regressions, people are sorted into three education attainment categories: less than high school graduate; high school graduate; and a person with any college training. We estimate two sets of

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the years from 1970 to the late 1990's by Rebecca Blank and Robert Schoeni. We thank them for providing us with these data.

<sup>35</sup> Indeed, positive assortative mating implies that we should expect the same effect even if only *high* skilled men were removed from the market by incarceration, since such men as remained who wished to be married would remained in the marriage market should always wish to marry the highest quality woman they can get.

models to assess sorting. The first, shown in the fourth column of the first panel, measures how incarceration rates affect wives' propensity to “marry down”. That is, this regression asks what fraction of *wives* have spouses with schooling less than theirs. The second model, presented in the fifth column of the first panel, measures wives' propensity to “marry up”, and asks: what fraction of *wives* in a marriage market have a husband whose schooling is greater than theirs? If the earlier insights from the standard marriage market model are correct, the shift in bargaining power from women to men associated with a reduction in the number of men in the market should have a non-negative effect on the incidence of “marrying down”, and should either lower or leave unchanged the likelihood of “marrying down” among women who do end up married. The strongly statistically significant results in the last two columns are consistent with these predictions. Again, these associations are of reasonable economic magnitudes; they imply that a one standard deviation higher level of incarceration is associated with a 14% increase in the incidence in marrying down, and a 7% decrease in the incidence of marrying up, relative to the means of these outcomes.

Are the lower ever married and marital sorting estimates in the baseline results in the first panel actually the result of higher incarceration, or is some unobserved trait of marriage markets responsible for the observed association? The bottom three panels of Table 5 present results from three models using standard panel data methods to account for endogeneity bias. The results are for two sets of difference models, in which we relate the within-market *change* in the female outcome on the *change* the incarceration rate over time. The last panel shows results where we use all of four Census years of data, and include the various fixed effects indicated in the table.

The estimated effects from the panel models are generally strongly significant and of the same sign as the associations in the first panel, but are much smaller in absolute value than the estimated associations in the first panel. In virtually all cases, the panel estimates are between one-quarter to one-third the estimated effect in the baseline models. For example, while the association between higher incarceration and the incidence of ever having married is -0.03 in the baseline estimates, the estimates in the 1980/2000 difference model and in the fixed effects model are -0.018 and -0.011, respectively. Despite the smaller point estimates, the panel results tell basically the same qualitative story as the baseline results in the first panel.

Table 6, which has the same layout as Table 5, presents the results for the other female outcomes. We earlier argued that, because higher male incarceration produced negative marriage outcomes for women, there should be increased incentive among women to undertake actions that raise their levels of economic independence. The baseline results in the first panel show that associations between males incarceration rates women's schooling and employment are not

consistent with this expectation. In particular, we find that a one point increase in incarceration is associated with women being *less* likely to have invested in schooling or to currently working for pay – although the effects are not at all large relative to the mean. The last set of results in the top panel indicate that higher incarceration rates are associated with a higher incidence of poverty among women in a market.

Perhaps even more than the baseline marriage results in the first table, the associations in Table 6 are subject to the criticism that they are contaminated by endogeneity bias. To the extent that some marriage markets have higher levels of unobserved social dysfunction, simple associations like those in the first panel are likely to show both high male incarceration and relatively poor outcomes for women. As in Table 5, the bottom three panels present results for fixed effects and difference models. The results show that these standard panel data methods of accounting for endogeneity bias have a very profound effect on the relationship of interest. For female schooling and employment, we find that increases over time *within* a marriage market are associated with *increases* in female schooling and employment. For example, the strongly significant point estimate of 0.012 from the fixed effects model implies that standard deviation increase in the incarceration rate of 2.8 percentage points raises the fraction of women in the market with any college training by about 7 percent. This effect, like that for the fraction of women who work for pay, is relatively modest, but is very consistent with the notion that higher male incarceration, by virtue of its negative effect on marriage outcomes, induced women to engage in behaviors that raised their levels of economic independence. Perhaps because of these reactions, the difference and fixed effects results for household poverty find effects statistically indistinguishable from zero.

## **5.2** *TSLS Estimates*

The results in Tables 5 and 6 reveal a sharp difference between the effect of male incarceration in baseline models, and models which exploit variation within marriage markets over time. In general, the various panel data models yield results consistent with what the standard marriage market model would predict, although of much smaller size than the simple associations. One reason the various panel data estimates models are smaller could be that these models correct for the influence of unobserved factors specific to marriage markets that bias the simple associations upwards. However, it is also possible that the smaller point estimates might be reflect the great attenuation bias likely to confound these panel estimates.

In Table 7, we present Two Squares Least Squares estimates of the 1990-2000 difference models presented in Tables 5 and 6. In these regressions, the change in a marriage market's

incarceration rate is instrumented for using the drug caseload and sentencing data earlier discussed. The first stage results for these regressions are the results in Table 4. The results in Table 7 are our most preferred because they account for both any endogeneity bias that survives the application of the panel data methods in Tables 5 and 6, as well as the effect of any attenuation bias associated with the mis-measurement of the marriage markets and the incidence of male incarceration within them. The table presents the estimated effect for all of the outcomes studied. We present results for the five different sets of instruments shown in Table 4.

The TSLS estimates for the ever married outcome are presented in the first column. A one point increase in the rate of incarceration within a marriage market is estimated by the TSLS specification to causally lower the incidence of ever being marriage among women in that market by 2.4 percentage points. This effect is very stable across the different instrument sets and is strongly significant. The TSLS estimate is smaller than the association of -0.03 estimated in the simple baseline model, but is almost nearly twice the size of fixed effects and difference estimates. This pattern of results suggests that the associational estimates were indeed upwards biased because of endogeneity bias, most likely because of the influence of unmeasured factors specific to market. However, this bias appears to have been relatively small. While the panel data estimates probably accounted for this bias, the estimates they produced appear to have been biased in the other direction (towards zero), most likely because of attenuation bias arising from the measurement error issues discussed above.

Reading across the columns in Table 7, the same basic pattern is evident. For all of the outcomes, the TSLS estimates are very stable across different instrument sets, and are between the associational and panel data methods in magnitude. In summary, these preferred estimates strongly suggest that male incarceration causally produced effects consistent with the standard marriage market model. It appears that increases in male incarceration, by lowering the number of men in the market, lowered the incidence of marriage among women, and especially less skilled women, and made women less likely to marry higher skilled men and more likely to marry men of lower skill when they did marry at all. In response to these changes, women appear to have increased their levels of schooling and their levels of labor force participation. The only outcome for which we are unable to make a definitive statement is the incidence of female poverty. The point estimates from the preferred specifications in Table 7 are positive, suggesting that higher male incarceration might be causally associated with a higher incidence of female poverty. However, the associated standard errors are too large to rule out that there is actually no effect on poverty at all, or even one that is negative.

### 5.3 *Some Extensions and Robustness Tests*

Before concluding, we present three extensions to our main results above. The first extension concerns the spatial definition of marriage markets. In all of the analysis conducted thus far we characterize market by respondents' states of birth, rather than their state of residence at the time of the survey. We earlier noted that our main reason for making this choice was that inmates might be systematically misclassified with respect to the marriage market to which they would belong were they free. How sensitive are our results to using state of birth rather than state of residence? The first row of Table 8 presents the results from the preferred TSLS regression of the effect of the change in incarceration on various outcomes for women, but with the marriage market measured by state of residence rather than state of birth as in the earlier tables. We show results using the instrument set (II) from the earlier tables, but the results are essentially unchanged across alternative set of drug prosecution and caseload instruments. To conserve space, we report only the estimated coefficient and (robust) standard error on the incarceration rate term from each of the twenty regressions.

The results indicate that, for all outcomes, the estimated effects when measuring marriage markets by state of residence are very close to those from the preferred state of birth estimates. For example, for the fraction of women ever married outcome, the preferred estimate from this instrument set for state of birth marriage markets is -0.024, while that from using state of birth marriage markets is -0.023. Our results appear quite robust to next most obvious alternative spatial definition of marriage markets.

In the second row of Table 8, we assess the importance of marriage market size. All of the main results are weighted by the size of the marriage market, the relevant regressions do not directly control for marriage market size. A concern might be that the estimated effect of incarceration rate could in fact be due to changes in cohort size. Men tend to marry younger women, so population growth or decline can have independent effects on women's marriage outcomes. For example, if there is population growth, women confront a situation where men of the sort they are likely to marry (i.e., older men) are scarce. If this growth coincides with rising incarceration, our analysis would incorrectly attribute all of the falling marriage to the increase in imprisonment, if population size were not controlled for. Controlling for marriage market size also accounts for any differential trends in large and small markets. When we control for (the change in) marriage market size, the results in the second row again show that we estimate effects not only qualitatively similar to the earlier results, but very close in quantitative magnitudes as well.

Finally, although this paper is about women's outcomes and behaviors, what does the marriage market model say about the effect of higher male incarceration rates on un-incarcerated men? The naive view is that all the predicted effects for the outcomes studied should be opposite in sign to those for women. In fact, there are only two cases where this is unambiguously so. Firstly, if men do marry, they should marry women of higher quality the higher the incarceration rate. And, married men who marry should unambiguously receive more of the gains from marriage when male incarceration rates are high. All of the other predictions for men are theoretically ambiguous.

One reason for this is the very different way that men and women appear to regard marriage. For example, casual empiricism suggests that if men find themselves scarce they are unlikely to form marriages, even though the numerical advantage in their favor implies that they *could*. Rather, they are likely to do things like have multiple sexual partners, or engage in serial monogamy, and eschew formal marriage. As a result, whether unincarcerated men marry more or less when male incarceration rates are high is theoretically ambiguous. Also ambiguous is the effect of incarceration on schooling and poverty. If men invest in schooling partly to make themselves attractive to potential spouses, diminished competition might lower the need for such actions and thus lower male schooling attainment. On the other hand, if men take advantage of the numerical advantage in their favor by not marrying, they forego some of the material gains from marriage, and have greater need to invest in schooling. By the same logic, the effect on male poverty is theoretically ambiguous as well.

Most importantly, whereas one could plausibly argue that male incarceration affects women mainly through its effects on the marriage market, higher male incarceration rates *mechanically* affects the distribution of outcomes of men who are not in jail outcomes, because incarceration does not draw evenly from the distribution of all men. For example, in markets with higher rates of growth in incarceration, levels of schooling of the men left out of jail will tend to increase simply because less educated men are more likely to be in jail. Much the same is true of employment probabilities of un-incarcerated men.

The caveats notwithstanding, what does an exercise similar to that for women, but with outcomes measured among the population of un-incarcerated men in a market, show? These results are presented in the third row of Table 8. The only outcome not shown is that for sorting: whether husbands have more or less education than their wives. Since the sorting regressions are run on precisely the same sample, and are simply the obverse of the results for women, we know that men who marry, are more likely to “marry up” when incarceration rates are high, confirming one of the two unambiguous predictions of the marriage market account. The rest of the results



indicate that higher rates of incarceration rates are associated with lower marriage probabilities for un-incarcerated men. Men appear to take advantage of being relatively scarce by putting off marriage. We find an increase in schooling among the population of un-incarcerated men when incarceration is high. As argued earlier, this may have less to do marriage market considerations than with the tendency for higher incarceration to make this mechanically true. Unlike women, we find that higher incarceration rates are associated with lower labor supply for men. Of the various outcomes, we regard this effect as the most likely to derive from a true causal effect of higher incarceration, as the mechanical effect outlined above would tend to produce an effect of the opposite sign. The last entry in the table shows that, as for women, there is no discernible effect of higher incarceration on male poverty rates. Although these results may be of independent interest, we caution that for reasons stated we do not view them as testing the marriage market interpretation attached to the rest of the results in the paper.

## **6 Conclusion**

In this paper we study how women have been affected by rising male incarceration levels over the past 30 years. Our various empirical strategies for breaking the possible endogenous relationship between marriage market outcomes and incarceration make use of two facts. First, we show that the increase in incarceration has not been uniform across all types of men. Instead, there has been tremendous variation in rates of incarceration across men of different races, locations and ages, and also great variation within each of these categories. Second, we show that most marriages occur within relatively narrow marriage markets, defined by the interaction of race, age and location. Taken together, these two facts imply that different types of women have been exposed to dramatically different shocks to the relative presence of men in their respective marriage markets. Using data on marriage markets over time, we estimate a series of panel data models which exploit variation in marriage markets over time. These models have two possible shortcomings: changes in incarceration might be associated with changes in unobserved factors within markets; and panel methods likely exacerbate any measurement error problems that confound our estimate.

With self-reported data on drug offending, we find suggestive evidence that changes in incarceration over time appear not to due to changes in male behavior, but rather to changes in policy. We then isolate variation in the change in incarceration rates with marriage markets attributable to a specific policy: the handling of drug cases following the initiation of the War on

Drugs. In a series of TSLS regressions, we then use these policy measures to account for any endogeneity associated with the change in incarceration as well as for the effect of measurement error.

Our results suggest that higher levels of male incarceration lower female marriage and increase the tendency for women to marry men of inferior quality when they do marry, precisely as implied by the standard marriage market model. We also show that women increase both their schooling and labor supply in the face of higher male incarceration, presumably as a rational reaction to the negative marriage market effects. The results are remarkably stable across a variety of specifications, and robust to alternative spatial definitions of marriage markets.

Our results identify an important externality of the policy of increased incarceration. Whether this policy is socially beneficial also depends, of course, on the degree to which imprisonment achieves its direct aim of lowering crime and punishing criminals, and the relative societal valuations of these ends. Our work has nothing to say about either of these things, but we argue that the results presented here should be a part of the debate about the societal wisdom of increased incarceration.

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**Table 1. Completed Schooling Among Incarcerated and Un-Incarcerated Men Across 1970-2000 Censuses.**

		<b>Incarcerated</b>		
	All	Whites	Blacks	Hispanics
Less Than High School	45.3%	39.5%	47.9%	54.1%
Exactly High School	36.9%	38.9%	36.6%	32.2%
At Least One Year College	17.8%	21.6%	15.5%	13.7%

		<b>Un-incarcerated</b>		
	All	Whites	Blacks	Hispanics
Less Than High School	15.2%	10.8%	19.8%	39.4%
Exactly High School	36.7%	36.5%	43.3%	32.6%
At Least One Year College	48.1%	52.8%	36.9%	28.0%

**Table 2. Marriage Markets: Fraction of Wives Marrying Husbands of Particular Races and Ages, from 1970 to 2000**

*Racial Sorting*

<u>Wife's Age</u>	<u>Wife's Race</u>	<u>Husband's Race</u>				<u>Total</u>
		<u>White</u>	<u>Black</u>	<u>Hispanic</u>	<u>Other</u>	
18-25	White	95.9%	0.5%	2.5%	1.0%	100%
	Black	1.9%	96.2%	1.4%	0.5%	100%
	Hispanic	23.4%	2.5%	72.4%	1.6%	100%
26-33	White	96.6%	0.5%	2.0%	0.9%	100%
	Black	1.7%	96.7%	1.0%	0.5%	100%
	Hispanic	28.9%	2.3%	66.9%	1.9%	100%

*Age Sorting*

<u>Wife's Race</u>	<u>Wife's Age</u>	<u>Husband's Age</u>			<u>Total</u>
		<u>20-27</u>	<u>28-35</u>	<u>Other</u>	
Whites	18-25	72.5%	22.6%	4.9%	100%
	26-33	11.4%	68.7%	20.0%	100%
Blacks	18-25	70.2%	23.9%	5.9%	100%
	26-33	12.0%	65.7%	22.3%	100%
Hispanics	18-25	72.5%	21.8%	5.7%	100%
	26-33	14.6%	66.6%	18.9%	100%

Data in this Table are from the four Decennial Censuses between 1970 and 2000. See text for additional details.

**Table 3. Prosecutions and Ultimate Dispensation of All Criminal Cases Brought in State Court**

	<b>Homicide</b>	<b>Rape</b>	<b>Robbery</b>	<b>Aggravated Assault</b>	<b>Burglary</b>	<b>Larceny</b>	<b>Drug Trafficking</b>	<b>Drug Possession</b>	<b>All Other Felonies</b>
<i>A. Distribution of All Felony Cases Brought in State Court, by Main Charge Faced by Defendant</i>									
Year									
1990	4.4%	6.5%	9.5%	10.4%	12.5%	10.7%	13.0%	8.4%	24.5%
1992	5.1%	7.0%	9.6%	11.0%	11.6%	9.6%	11.4%	8.2%	26.4%
1994	4.9%	6.7%	8.0%	11.8%	9.4%	8.7%	11.9%	7.7%	30.8%
1996	1.5%	3.3%	6.3%	7.7%	10.4%	10.5%	23.6%	13.6%	23.2%
1998	1.3%	3.1%	5.5%	7.7%	9.4%	10.3%	23.6%	15.2%	24.0%
2000	1.1%	3.4%	5.6%	8.6%	9.0%	10.0%	22.8%	15.0%	24.5%
<i>B. Fraction of Cases in Which Defendant Convicted, by Main Charge Faced at Trial and Year</i>									
Year									
1990	92.1%	66.0%	73.4%	46.8%	55.7%	43.0%	50.4%	39.1%	39.6%
1992	92.8%	67.3%	74.2%	45.8%	54.3%	41.0%	50.5%	36.7%	37.9%
1994	95.8%	73.2%	77.7%	54.0%	54.7%	42.3%	49.6%	37.1%	42.6%
1996	93.6%	63.5%	73.8%	43.5%	49.0%	35.2%	42.6%	32.2%	34.5%
1998	93.3%	67.4%	76.3%	48.3%	56.1%	43.3%	46.2%	38.5%	39.1%
2000	92.0%	65.4%	74.6%	45.9%	55.0%	38.9%	45.6%	39.8%	37.8%
<i>C. Fraction of Convicted Defendants Sentenced to Prison/Jail Term, by Charge at Trial and Year</i>									
Year									
1990	96.6%	88.3%	93.2%	79.5%	81.6%	75.7%	79.8%	71.4%	73.3%
1992	97.1%	89.1%	91.7%	78.6%	80.2%	75.1%	81.5%	69.2%	71.4%
1994	99.2%	90.7%	93.2%	84.6%	82.8%	78.3%	80.9%	74.7%	77.8%
1996	96.4%	85.3%	92.5%	81.1%	78.7%	73.9%	81.2%	80.1%	72.3%
1998	97.9%	83.9%	91.2%	78.2%	80.6%	72.2%	75.4%	74.7%	69.9%
2000	97.6%	85.4%	92.8%	78.2%	81.2%	70.8%	74.2%	73.2%	71.9%
<i>D. Distribution of Main Charge at Trial, of All Persons Convicted and Sentenced to Prison/Jail</i>									
Year									
1990	5.2%	6.4%	11.4%	10.4%	14.1%	10.4%	13.8%	8.0%	20.3%
1992	6.2%	7.3%	11.6%	10.9%	12.5%	9.1%	12.4%	7.2%	22.8%
1994	5.7%	6.7%	9.1%	11.8%	9.7%	8.2%	12.1%	7.9%	28.8%
1996	2.0%	3.2%	6.9%	8.0%	10.8%	10.0%	25.3%	13.8%	20.1%
1998	1.7%	3.0%	6.5%	8.2%	10.1%	10.0%	25.0%	14.3%	21.2%
2000	1.5%	3.4%	6.9%	9.0%	9.9%	9.1%	24.2%	13.4%	22.7%
<i>E. Mean Maximum Sentence (months), of All Persons Convicted and Sentenced to Prison/Jail</i>									
Year									
1990	244.8	160.6	117.3	73.5	78.6	51.2	72.2	48.8	52.2
1992	247.9	141.3	116.7	81.2	75.7	53.7	69.3	47.3	50.3
1994	277.2	141.7	112.7	84.1	67.1	43.3	62.1	40.6	45.3
1996	269.6	104.7	96.3	67.8	55.0	37.7	50.7	34.9	40.7
1998	281.8	108.9	106.4	66.2	50.5	34.5	49.2	31.7	36.9
2000	255.3	96.1	97.6	60.4	50.3	31.9	48.8	32.5	35.2

Data are from multiple years of the National Judicial Reporting Program Series (NCJRPS). See Text for details.



**Table 4. Effect of Incidence Drug Crimes in Overall State Caseloads and Dispensation of Drug Cases Convictions Between 1990 and 2000 on Change in Male Incarceration Rates For Race/State/Age Cells From 1990-2000.**

<i>Variable</i>	<b>Dependent Variable: Change in Incarceration Rate 1990-2000 for State/Race/Age Group</b>									
	<i>Court and Sentence Data Are Averages from 1990-2000 at State/Race Level</i>									
	<b>(I)</b>		<b>(II)</b>		<b>(III)</b>		<b>(IV)</b>		<b>(V)</b>	
Fraction of All Cases Drug Trafficking	0.1032				0.0976	0.1006	0.0917	0.0934	0.0959	
	[0.0223]**				[0.0216]**	[0.0223]**	[0.0225]**	[0.0215]**	[0.0219]**	
Fraction of All Cases Drug Possession		0.0547			0.0574			0.0522	0.0531	
		[0.0282]			[0.0251]*			[0.0248]*	[0.0249]*	
% of Convicted Drug Traffickers Sent to Prison			0.0185				0.0029			-0.0068
			[0.0087]*				[0.0079]			[0.0088]
% of Convicted Drug Possessors Sent to Prison				0.0165			0.0119	0.0100	0.0124	
				[0.0056]**			[0.0060]*	[0.0058]	[0.0063]	
<i>Controls</i>										
Maximum Welfare Payments in State (\$1000)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total Reported Property Crime in State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total Reported Personal Crime in State	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	222	192	220	192	186	220	186	186	186	186
R-squared	0.47	0.41	0.39	0.42	0.5	0.47	0.49	0.51	0.51	0.51
F-stat that coefficients about sentences are zero	21.33	3.78	4.53	8.56	11.50	10.41	10.53	8.15	7.60	7.60

Robust standard errors in brackets

\* significant at 5%; \*\* significant at 1%

**Table 5. Linear Probability Estimates of Effect of Male Incarceration Rate on Women's Marital Outcomes in Marriage Market, from Alternative Regression Specifications. (Robust Standard Errors in Parentheses).**

	(I)	(II)	(III)	(IV) Wife's Ed > Husband's Ed ?	(V) Wife's Ed < Husband's Ed?
<i>Mean of Dependent Var.</i>	0.58	0.62	0.53	0.18	0.19
<b>Base Specification</b>					
<b>Controls:</b> Max State Welfare Payments, Total Personal and Property Crime in State	-0.030 [0.0019]**	-0.038 [0.0022]**	-0.021 [0.0014]**	0.009 [0.0005]**	-0.005 [0.0007]**
Mean in Market Taken Over	All Women	< College	Any College	All Wives	All Wives
# of Obs.	1195	1191	1153	1177	1177
R-Squared	0.15	0.23	0.11	0.34	0.31
<b>Difference Estimate: 1980-2000 Change</b>					
<b>Controls:</b> Change in Base	-0.018 [0.0026]**	-0.021 [0.0030]**	-0.015 [0.0021]**	0.003 [0.0012]*	-0.010 [0.0017]**
Mean in Market Taken Over	All Women	< College	Any College	All Wives	All Wives
# of Obs.	306	305	292	301	301
R-Squared	0.64	0.62	0.67	0.42	0.58
<b>Difference Estimate: 1990-2000 Change</b>					
<b>Controls:</b> Change in Base	-0.01 [0.0015]**	-0.01 [0.0023]**	-0.007 [0.0007]**	0.002 [0.0006]*	-0.005 [0.0015]**
Mean in Market Taken Over	All Women	< College	Any College	All Wives	All Wives
# of Obs.	306	303	296	300	300
R-Squared	0.45	0.38	0.36	0.21	0.4
<b>Fixed Effects Estimates</b>					
<b>Controls:</b> Base + Marriage Market Fixed Effects, Time, Time*Race, Time*State, Time*Age	-0.011 [0.0016]**	-0.013 [0.0020]**	-0.010 [0.0012]**	0.002 [0.0007]**	-0.009 [0.0016]**
Mean in Market Taken Over	All Women	< College	Any College	All Wives	All Wives
# of Obs.	1195	1191	1153	1177	1177
R-Squared	0.98	0.97	0.98	0.88	0.83

Regression are performed at the level of the marriage market: individual level Census data are aggregated to race/state/age cells.

Fixed Effects Specification Corresponds to Equation (3) in text. Difference models to Equation (2).

For any particular outcome, mean is taken over all women on indicated sample in race/state/age cell. If no women of particular type in market, cell dropped.

See text for additional details.

**Table 6. OLS Estimates of Effect of Male Incarceration Rate on Women's Schooling Attainment, Employment and Likelihood of Living in Poverty. (Robust Standard Errors in Parentheses).**

	<u>Yrs. School</u>	<u>Any College?</u>	<u>Work for Pay?</u>	<u>Household Poor?</u>
<i>Mean of Dependent Var.</i>	12.92	0.48	0.64	0.18
<b>Base Specification</b>	-0.043	-0.006	-0.007	0.021
<b>Controls:</b> Max State Welfare Payments, Total Personal and Property Crime in State	[0.0057]**	[0.0013]**	[0.0008]**	[0.0011]**
# of Obs.	1195	1195	1195	1195
R-Squared	0.24	0.28	0.20	0.36
<b>Difference Estimate: 1980-2000 Change</b>				
<b>Controls:</b> Change in <b>Base</b>	0.072	0.015	0.006	0.002
	[0.0113]**	[0.0028]**	[0.0011]**	[0.0014]
# of Obs.	306	306	306	306
R-Squared	0.61	0.58	0.40	0.28
<b>Difference Estimate: 1990-2000 Change</b>				
<b>Controls:</b> Change in <b>Base</b>	0.027	0.006	0.005	-0.002
	[0.0080]**	[0.0020]**	[0.0007]**	[0.0009]*
# of Obs.	306	306	306	306
R-Squared	0.3	0.31	0.32	0.18
<b>Fixed Effects Estimates</b>				
<b>Controls:</b> <b>Base</b> + Marriage Market Fixed Effects, Time, Time*Race, Time*State, Time*Age	0.052	0.012	0.006	0.000
	[0.0069]**	[0.0017]**	[0.0006]**	[0.0009]
# of Obs.	1195	1195	1195	1195
R-Squared	0.9	0.91	0.83	0.96

Regression are performed at the level of the marriage market: individual level Census data are aggregated to race/state/age cells.

Fixed Effects Specification Corresponds to Equation (3) in text. Difference models to Equation (2).

For any particular outcome, mean is taken over all women on indicated sample in race/state/age cell. If no women of particular type in market, cell dropped. See text for additional details.

**Table 7. Two Stage Least Squares (TSLS) Estimates of Effect of Change in Male Incarceration Rate on Change in Female Outcomes in Marriage Market from 1990 to 2000. [Robust Standard Errors in Brackets].**

Dependent Variable: 1990 to 2000 Change Among in Mean Among All Women in Marriage Market in:

	<u>Ever Married</u>	<u>Wife's Ed &gt; Husband's Ed ?</u>	<u>Wife's Ed &lt; Husband's Ed?</u>	<u>Yrs. School</u>	<u>Any College?</u>	<u>Work for Pay?</u>	<u>Household Poor?</u>
<i>Instrument Set From Table 4</i>							
Instrument Set 1 F-Stat: 21.33	-0.0247 [0.0043]**	0.0061 [0.0018]**	-0.0292 [0.0054]**	0.1318 [0.0249]**	0.0326 [0.0063]**	0.0083 [0.0015]**	0.0037 [0.0026]
Instrument Set 2 F-Stat: 11.5	-0.0237 [0.0041]**	0.005 [0.0016]**	-0.0286 [0.0051]**	0.1262 [0.0244]**	0.0301 [0.0059]**	0.0083 [0.0015]**	0.0021 [0.0024]
Instrument Set 3 F-Stat: 10.53	-0.0245 [0.0040]**	0.0055 [0.0017]**	-0.0283 [0.0049]**	0.1322 [0.0242]**	0.0318 [0.0059]**	0.0078 [0.0015]**	0.0025 [0.0024]
Instrument Set 4 F-Stat: 10.41	-0.0249 [0.0043]**	0.0062 [0.0019]**	-0.0296 [0.0054]**	0.1327 [0.0252]**	0.0329 [0.0064]**	0.0083 [0.0015]**	0.0039 [0.0027]
Instrument Set 5 F-Stat: 7.6	-0.0236 [0.0042]**	0.005 [0.0016]**	-0.0285 [0.0051]**	0.126 [0.0245]**	0.0301 [0.0059]**	0.0082 [0.0015]**	0.0022 [0.0024]

Each point estimate represents results from a separate TSLS specification. First stage results, for each set of excluded instruments, are shown in Table 4.

Each regression contains controls for the change in maximum welfare payments, the level of property crime, and the level of personal crime in the state between 1990 and 2000.

See text for additional details.

Robust Standard Errors in Parentheses.

**Table 8. Two Stage Least Squares (TSLS) Estimates of Effect of 1990-2000 Change in Male Incarceration Rate, for Specific Alternative Specifications Indicated In Table. All Results Use Instrument Set II from Table 4. [Robust Standard Errors in Brackets].**

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Dependent Variable: 1990 to 2000 Change Among in Mean Among Women (Men in Third Row) in Marriage Market in:

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	<u>Ever Married</u>	<u>Wife's Ed &gt; Husband's Ed ?</u>	<u>Wife's Ed &lt; Husband's Ed?</u>	<u>Yrs. School</u>	<u>Any College?</u>	<u>Work for Pay?</u>	<u>Household Poor?</u>
<i>Extension/Alternative Specification</i>							
Marriage Market Measured by State of Residence	-0.023 [0.0041]**	0.003 [0.0015]*	-0.028 [0.0048]**	0.127 [0.0240]**	0.030 [0.0058]**	0.008 [0.0017]**	0.001 [0.0024]
Controls for Total Number of Men and Women in Market	-0.026 [0.0035]**	0.007 [0.0016]**	-0.027 [0.0035]**	0.137 [0.0191]**	0.033 [0.0047]**	0.009 [0.0014]**	0.004 [0.0023]
Outcome is Mean for Un-Incarcerated Men In Marriage Market	-0.023 [0.0044]**			0.113 [0.0189]**	0.025 [0.0044]**	-0.013 [0.0018]**	0.002 [0.0015]

---

Each point estimate represents results from a separate TSLS specification. First stage results, for each set of excluded instruments, are shown in Table 4. Each regression contains controls for the change in maximum welfare payments, the level of property crime, and the level of personal crime in the state between 1990 and 2000. See text for additional details. Robust Standard Errors in Parentheses.

Appendix Table 1. Incarceration rate by state of birth, year and race, Men aged 20-35

	Whites			
	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Alabama	0.64%	0.98%	0.91%	1.82%
Alaska	0.00%	1.40%	1.14%	2.69%
Arizona	0.38%	1.30%	1.10%	3.17%
Arkansas	0.79%	0.98%	0.82%	1.82%
California	1.15%	1.18%	1.14%	1.96%
Colorado	0.91%	1.02%	0.80%	1.88%
Connecticut	0.47%	0.80%	0.65%	1.33%
Delaware	1.01%	1.18%	0.74%	1.40%
District of Columbia	1.37%	1.28%	1.01%	1.61%
Florida	0.57%	1.46%	1.89%	2.66%
Georgia	0.76%	1.12%	1.38%	2.45%
Hawaii	0.47%	1.04%	1.25%	2.54%
Idaho	0.14%	0.87%	0.80%	1.49%
Illinois	0.49%	0.78%	0.62%	1.34%
Indiana	0.54%	0.99%	1.02%	1.76%
Iowa	0.29%	0.76%	0.66%	1.25%
Kansas	0.76%	0.81%	0.92%	1.40%
Kentucky	0.55%	1.03%	1.11%	1.90%
Louisiana	0.46%	1.06%	1.05%	2.02%
Maine	0.76%	1.13%	0.73%	1.36%
Maryland	0.79%	1.01%	1.12%	1.31%
Massachusetts	0.77%	0.80%	0.85%	1.23%
Michigan	0.59%	0.90%	0.74%	1.68%
Minnesota	0.74%	0.91%	0.39%	0.84%
Mississippi	1.23%	0.85%	0.88%	1.97%
Missouri	0.70%	0.87%	1.09%	1.46%
Montana	0.43%	0.68%	0.75%	1.98%
Nebraska	0.42%	0.65%	0.65%	1.13%
Nevada	1.35%	0.68%	1.47%	2.66%
New Hampshire	0.97%	1.08%	0.76%	1.95%
New Jersey	0.52%	0.66%	0.67%	1.22%
New Mexico	0.89%	0.77%	1.14%	1.48%
New York	0.54%	0.79%	0.66%	1.13%
North Carolina	0.93%	1.12%	1.07%	1.52%
North Dakota	0.10%	0.71%	0.63%	0.76%
Ohio	0.63%	0.83%	0.93%	1.56%
Oklahoma	0.85%	1.24%	1.34%	2.52%
Oregon	0.77%	1.11%	1.37%	1.93%
Pennsylvania	0.32%	0.74%	0.69%	1.19%
Rhode Island	0.60%	0.83%	0.84%	0.79%
South Carolina	1.09%	1.39%	1.51%	2.05%
South Dakota	0.61%	0.93%	0.63%	1.47%
Tennessee	0.86%	1.11%	1.18%	2.27%
Texas	0.85%	1.12%	1.07%	2.59%
Utah	0.49%	0.70%	0.64%	1.37%
Vermont	0.68%	0.95%	0.79%	1.17%
Virginia	1.06%	0.97%	1.04%	1.37%
Washington	0.77%	1.06%	1.06%	1.86%
West Virginia	0.92%	0.94%	0.82%	1.45%
Wisconsin	0.67%	0.64%	0.52%	1.41%
Wyoming	0.31%	0.65%	0.65%	1.99%

Data are from Multiple Census Years. See text for details.

Appendix Table 1. Incarceration rate by state of birth, year and race, Men aged 20-35  
Blacks

	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Alabama	2.56%	3.60%	4.45%	10.01%
Alaska				
Arizona	4.55%	8.64%	11.42%	22.04%
Arkansas	1.80%	3.81%	4.68%	8.50%
California	7.46%	5.95%	6.49%	13.04%
Colorado	13.64%	3.81%	7.61%	17.11%
Connecticut	2.04%	4.67%	8.04%	16.38%
Delaware	0.00%	5.96%	6.82%	12.34%
District of Columbia	6.08%	5.07%	7.74%	7.46%
Florida	4.51%	5.92%	11.97%	13.55%
Georgia	3.20%	4.25%	6.46%	10.21%
Hawaii	0.00%	5.88%	9.09%	16.28%
Idaho				
Illinois	5.21%	5.23%	5.54%	15.82%
Indiana	5.36%	6.38%	7.26%	13.12%
Iowa	0.00%	6.37%	11.05%	16.53%
Kansas	6.33%	5.49%	8.05%	11.62%
Kentucky	4.21%	4.58%	5.28%	13.73%
Louisiana	2.92%	4.31%	4.96%	11.48%
Maine				
Maryland	6.95%	6.14%	6.55%	9.19%
Massachusetts	1.52%	5.85%	7.09%	12.33%
Michigan	5.51%	6.03%	6.25%	12.15%
Minnesota	0.00%	6.54%	4.58%	23.40%
Mississippi	2.43%	3.35%	3.90%	9.43%
Missouri	4.49%	6.41%	8.22%	9.03%
Montana				
Nebraska	0.00%	7.96%	6.25%	12.20%
Nevada	0.00%	11.90%	10.95%	16.96%
New Hampshire				
New Jersey	5.96%	5.52%	8.85%	15.15%
New Mexico	0.00%	11.32%	4.00%	29.87%
New York	5.64%	6.73%	8.91%	14.85%
North Carolina	3.14%	4.44%	4.42%	9.13%
North Dakota				
Ohio	6.17%	5.32%	7.11%	11.93%
Oklahoma	4.19%	5.64%	9.97%	17.54%
Oregon	15.38%	4.61%	7.14%	17.62%
Pennsylvania	3.33%	5.20%	6.83%	17.97%
Rhode Island				
South Carolina	3.13%	3.56%	5.56%	8.07%
South Dakota				
Tennessee	3.40%	4.13%	4.78%	12.99%
Texas	4.50%	5.52%	7.23%	13.95%
Utah				
Vermont				
Virginia	4.86%	4.51%	5.19%	8.54%
Washington	14.29%	13.08%	5.96%	17.89%
West Virginia	7.00%	4.71%	3.65%	15.06%
Wisconsin	18.75%	6.79%	9.18%	23.03%
Wyoming				

Data are from Multiple Census Years. See text for details.

Table excludes states with cell sizes too small to compute means.

Appendix Table 1. Incarceration rate by state of birth, year and race, Men aged 20-35

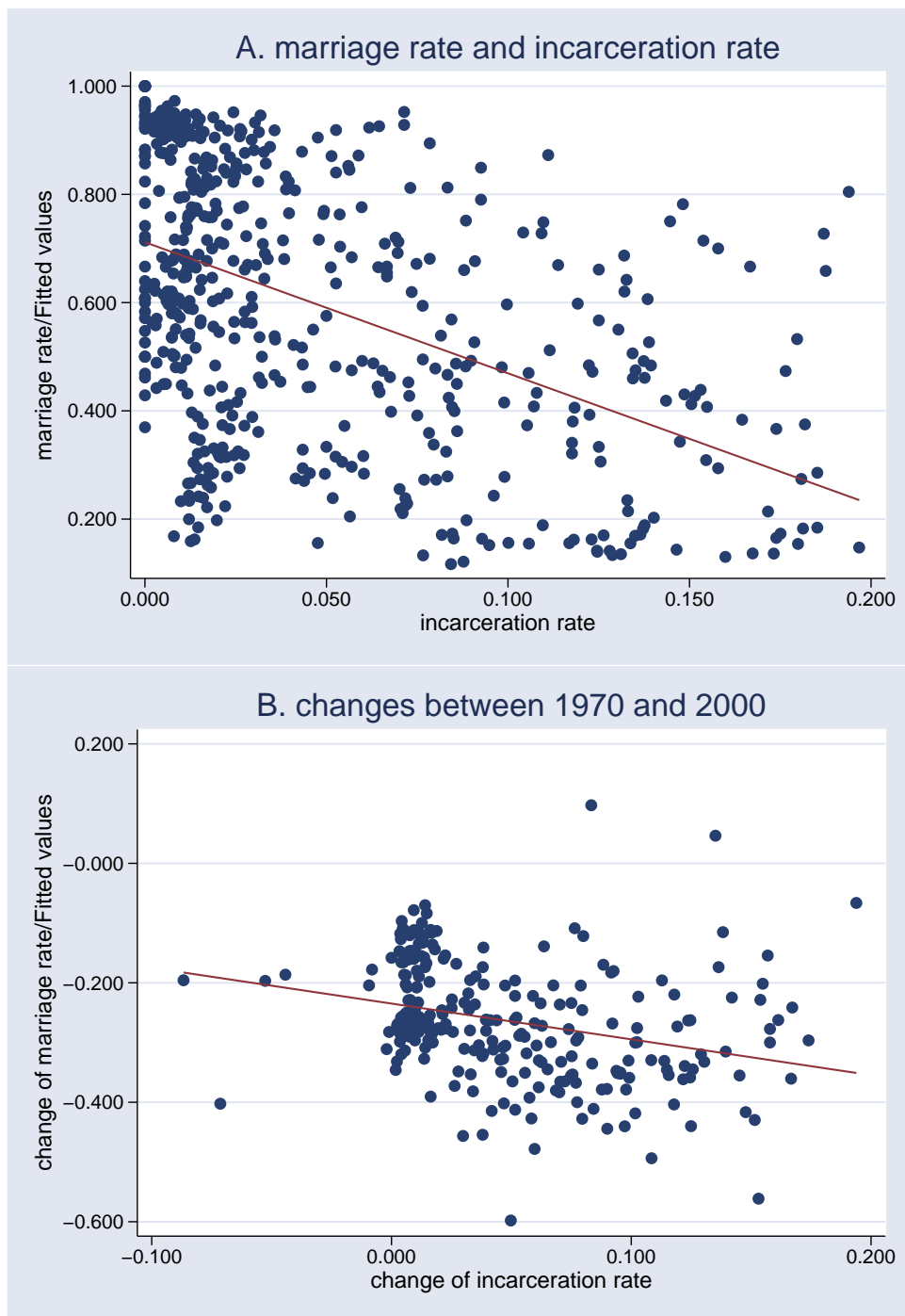
	Hispanics			
	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Alabama	1.93%	4.52%	6.06%	9.45%
Alaska				
Arizona	2.12%	1.99%	2.67%	6.28%
Arkansas				
California	2.70%	2.54%	2.30%	4.54%
Colorado	1.85%	1.95%	2.96%	5.31%
Connecticut	2.46%	3.03%	7.22%	8.42%
Delaware				
District of Columbia	4.05%	0.75%	6.52%	6.76%
Florida	3.91%	1.88%	2.82%	5.35%
Georgia	3.18%	4.04%	2.70%	18.33%
Hawaii	1.56%	2.25%	2.89%	8.96%
Idaho	0.00%	0.91%	4.47%	7.75%
Illinois	1.97%	2.13%	2.43%	5.54%
Indiana	2.07%	1.47%	2.95%	6.09%
Iowa	2.17%	0.77%	1.44%	7.14%
Kansas	0.98%	1.87%	2.19%	5.57%
Kentucky	1.02%	0.00%	4.17%	10.88%
Louisiana	7.41%	1.70%	4.00%	12.84%
Maine				
Maryland	5.26%	1.72%	3.80%	3.36%
Massachusetts	4.03%	2.73%	6.79%	9.89%
Michigan	2.76%	3.00%	1.99%	6.39%
Minnesota	2.07%	2.13%	1.99%	8.23%
Mississippi	1.59%	1.91%	2.99%	14.42%
Missouri	2.58%	2.92%	3.54%	5.99%
Montana				
Nebraska	1.37%	2.56%	1.57%	13.11%
Nevada	0.00%	3.13%	1.90%	9.36%
New Hampshire				
New Jersey	1.67%	3.10%	4.65%	7.20%
New Mexico	0.98%	2.08%	2.29%	4.19%
New York	2.71%	2.86%	4.90%	7.34%
North Carolina	1.24%	3.02%	3.13%	11.40%
North Dakota				
Ohio	1.55%	3.55%	2.88%	7.54%
Oklahoma	3.52%	2.42%	3.11%	11.11%
Oregon	4.72%	4.07%	1.43%	9.38%
Pennsylvania	1.65%	1.81%	4.62%	13.25%
Rhode Island	5.08%	6.82%	4.00%	3.13%
South Carolina	2.79%	4.32%	3.23%	10.16%
South Dakota				
Tennessee	1.43%	1.65%	2.47%	28.73%
Texas	1.96%	1.90%	2.26%	5.44%
Utah	1.14%	1.95%	4.61%	10.50%
Vermont				
Virginia	2.63%	3.68%	3.30%	5.67%
Washington	2.44%	2.24%	1.40%	6.31%
West Virginia				
Wisconsin	0.73%	2.49%	3.63%	11.11%
Wyoming	2.08%	2.67%	4.88%	17.10%

Data are from Multiple Census Years. See text for details.

Table excludes states with cell sizes too small to compute means.



Figure 1: Marriage Rate and Incarceration Rate in 1970 and 2000



**Figure 2. Fraction of Men Aged 20-35 of Different Races and Born in Different States Who Are Incarcerated in Census Year: Mean, 10th, and 90th Percentile Across All States of Birth.**

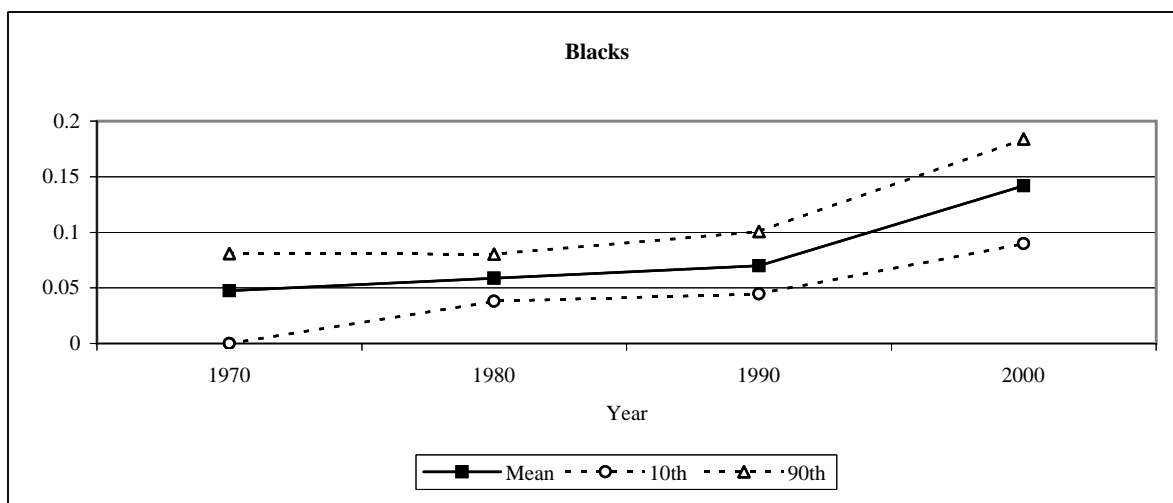
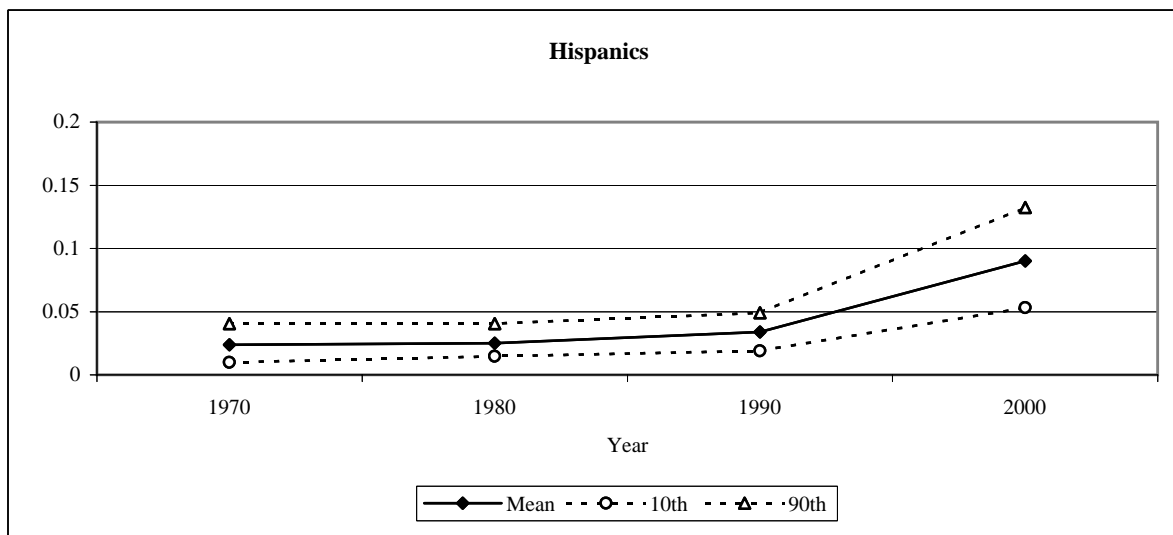
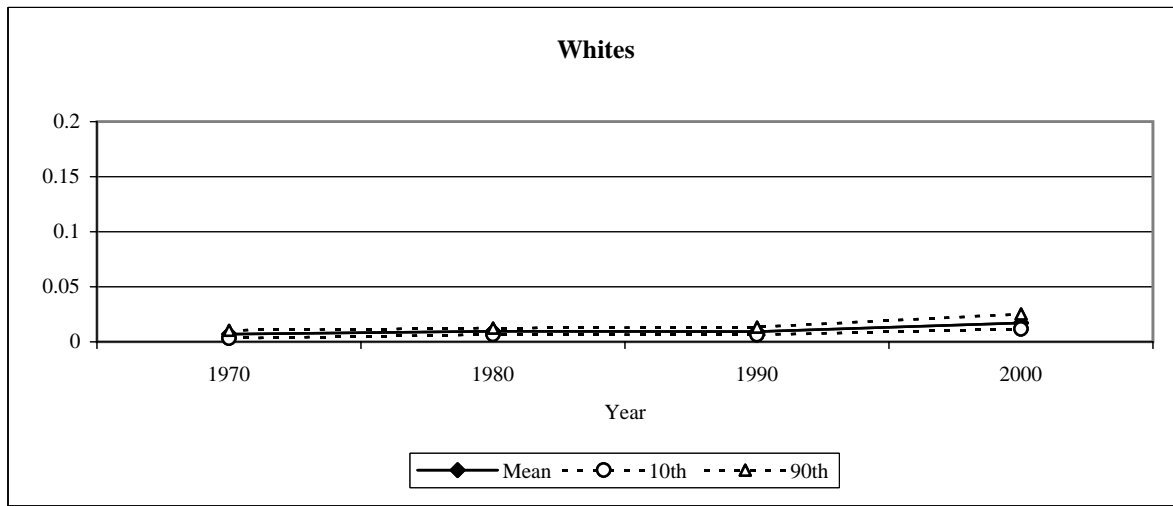


Figure 3. Impact of Removal of Men From Marriage Market on Marriage and Sorting Outcomes

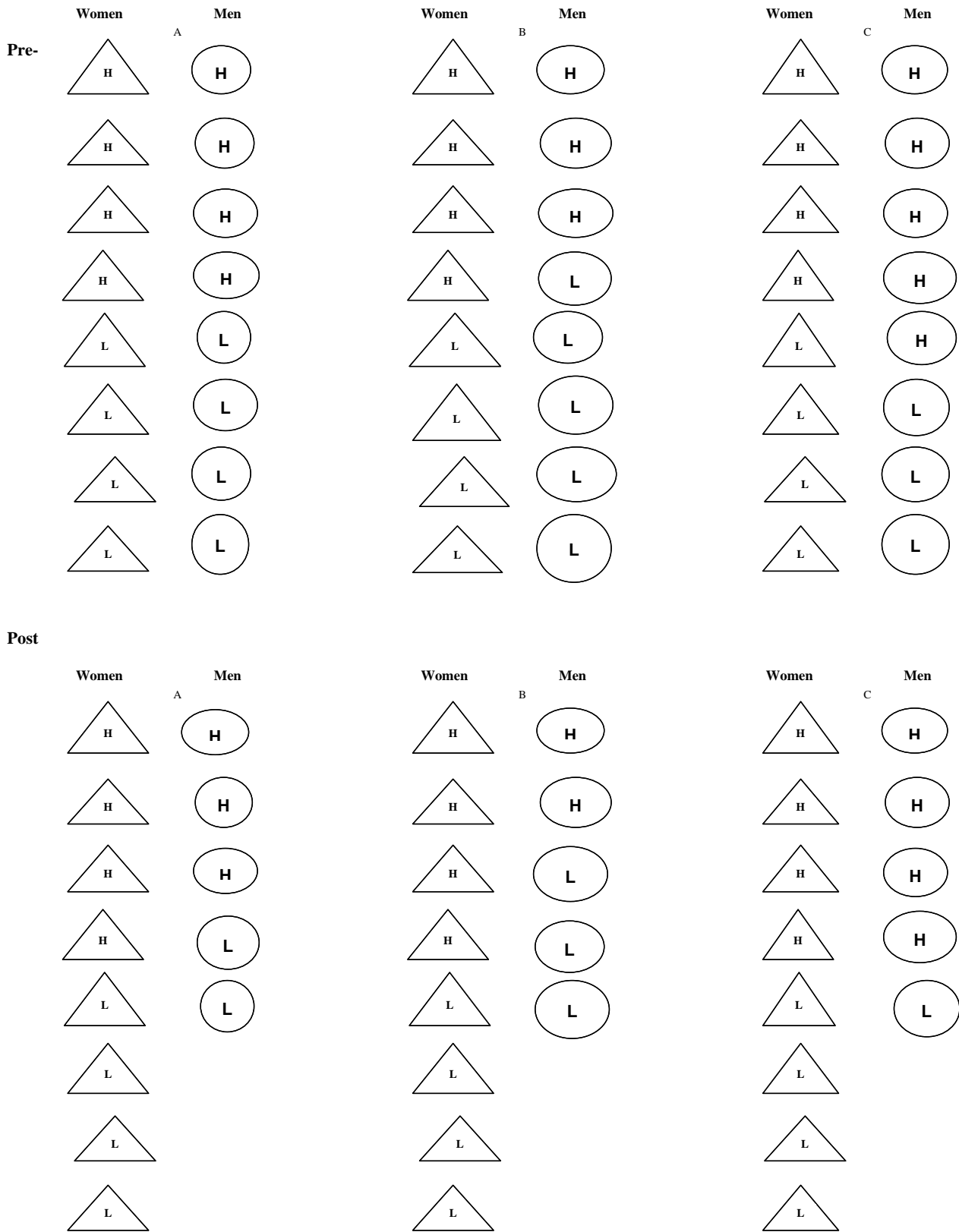


Figure 4: Relationship Between Adolescent Drug Use and Rate of Adult Incarceration, by Race and Census Region, for Different Generations of American Men

